No. 612,977. Patented Oct. 25, 1898.

A. L. RIKER.

ARMATURE WINDING.

(Application filed Apr. 18, 1898.)

(No Model.)

Fig. 1.

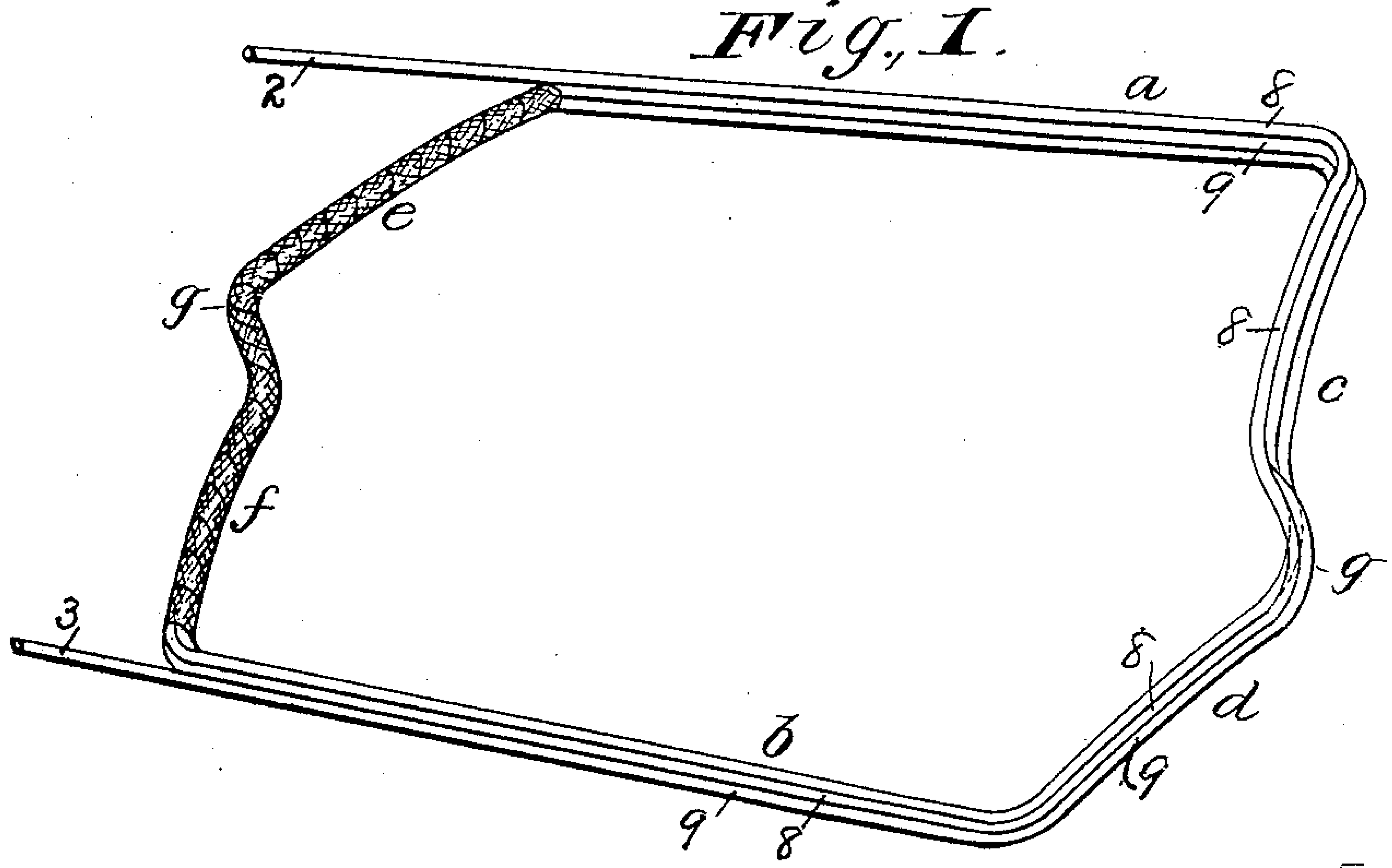


Fig. 3.

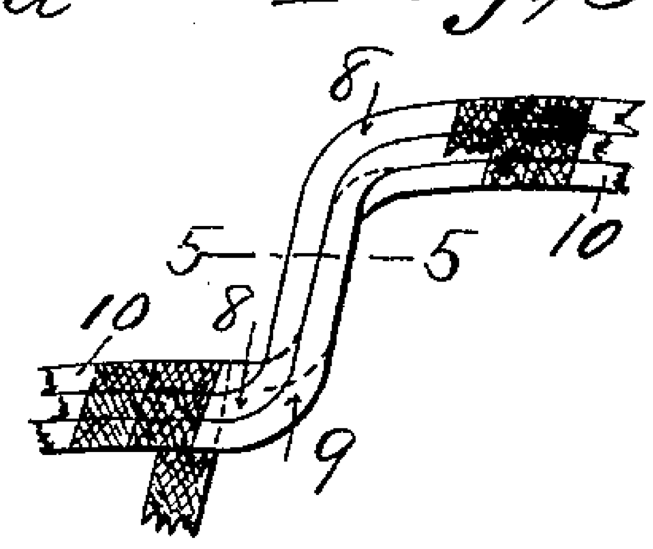


Fig. 2.

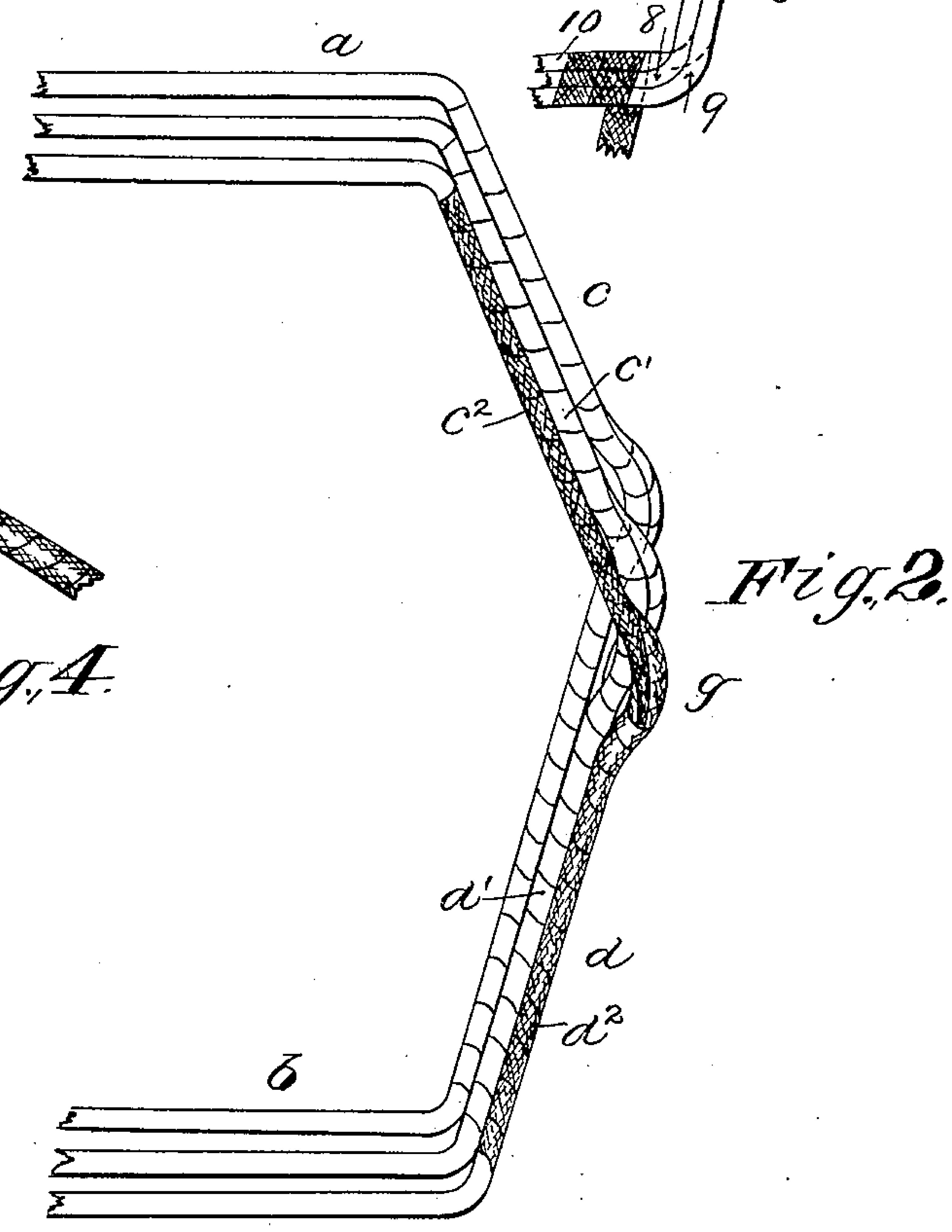
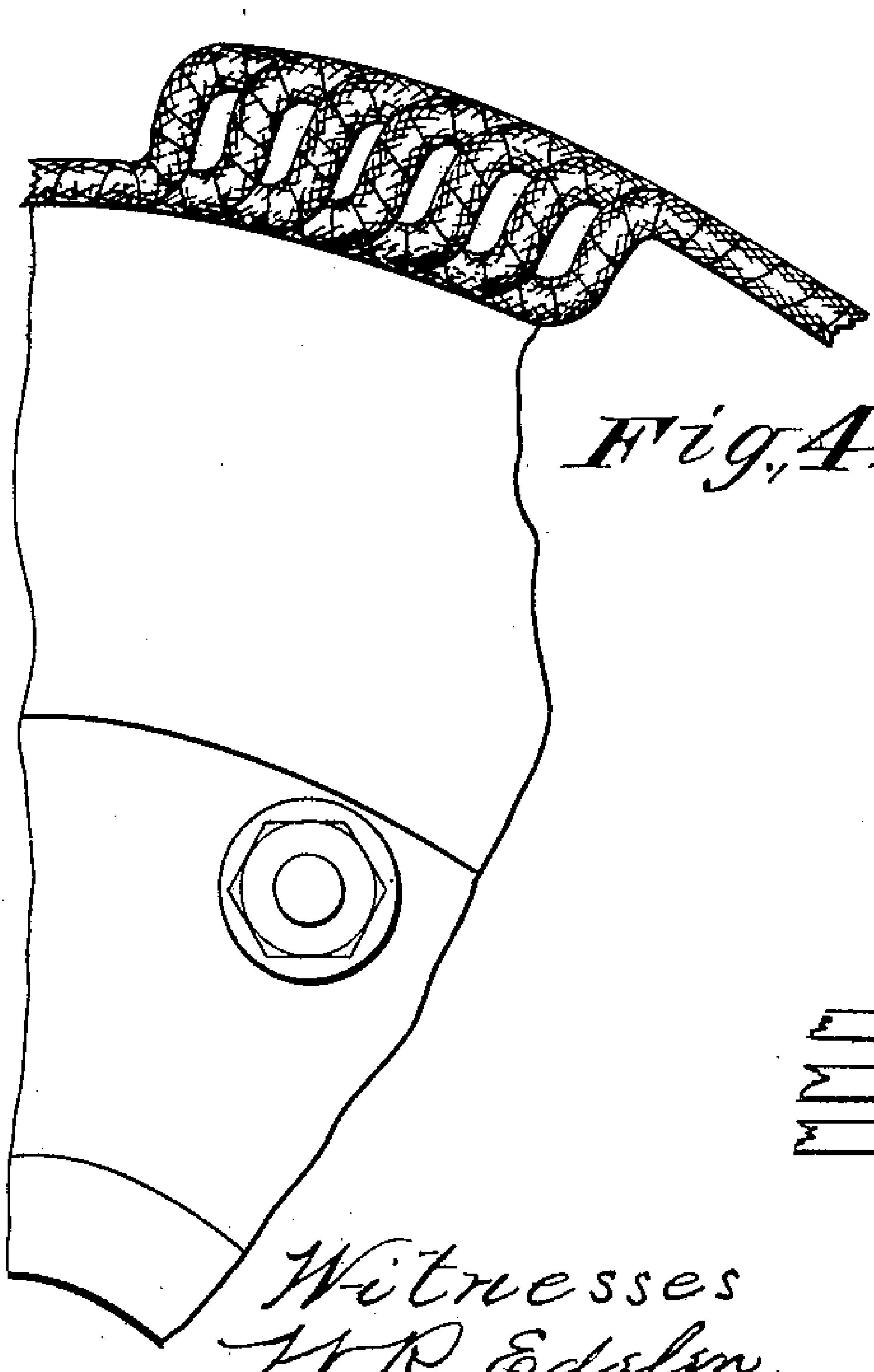


Fig. 4.



Witnesses
W. R. Edelen.
Reave Lewis

Inventor:
Andrew L. Riker by
Pollok & Mauro his attorneys

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

ANDREW L. RIKER, OF NEW YORK, N. Y.

ARMATURE-WINDING.

SPECIFICATION forming part of Letters Patent No. 612,977, dated October 25, 1898.

Original application filed November 19, 1897, Serial No. 659,163. Divided and this application filed April 18, 1898. Serial No. 677,963. (No model.)

To all whom it may concern:

Be it known that I, ANDREW L. RIKER, of New York, N. Y., have invented a new and useful Improvement in Armature-Windings, which Improvement is fully set forth in the following specification.

This application is a division and continuation of my application, Serial No. 659,163, filed November 19, 1897, which describes and illustrates a coiling frame or former for winding armature-coils.

The present invention relates more particularly to the form and construction of the armature-coils themselves.

The general type of winding to which this invention relates is well known and has certain recognized advantages.

The object of the present invention is to obviate certain difficulties and disadvantages attending the construction and use of such windings, to economize wire, to facilitate the assembling of the coils and their connections with the commutator, and to render the removal and replacement of a burned-out or damaged coil less difficult than heretofore.

The coil is of hexagonal form, composed of any desired number of turns of round wire. Those portions of the coil which project beyond the end of the armature-core occupy substantially the same plane as the parallel sides of the coil which lie in the slots of the core. Massing of the wires at the heads of the core is thus avoided. At each end of the coil is a bend or offset to permit the assembling or grouping of the several coils upon the armature-body, this being a common feature of such armature-windings. The improved coil, however, differs in construction at this point in an important particular from all other coils of this type of which I have knowledge. Except at the two downward bends the coil, regardless of the number of turns of which it is composed, has the thickness of a single wire, whereas at the downward bend it has always the thickness of two wires. At all other parts of the coil the successive turns lie one above the other, each additional turn increasing only the height of the coil. At the downward bends the additional turns beyond two fall into pairs, one behind the other, increasing the width of the coil at these points—*i.e.*, the dimension lengthwise of the armature—leaving the thickness at this point always that of two wires. By this plan of winding round wires a coil is produced in which the terminals or leads project one in the plane of the top turn and the other in the plane of the bottom turn, whereas when the successive wires shift positions or cross at the bends the leads come out in the same plane. The improved construction furthermore furnishes a very compact coil in which there is a minimum waste of wire.

In the accompanying drawings, which form part of this specification, Figure 1 represents in perspective one of the coils as completed and ready for application to an armature-core. Fig. 2 is a plan view of a group of such coils, showing how they fit together. Fig. 3 is an end elevation of the bend of a coil, the covering-tape being partly removed; and Fig. 4 is an end elevation of part of an armature constructed in accordance with the invention.

The coil shown in the drawings is composed of three turns of round wire, but the number may of course be greater or less. The coil is hexagonal in shape. The opposite parallel sides *a b*, Fig. 1, are the parts which occupy slots in the armature-core. The remaining sides of the hexagon *c d e f* are the connecting parts, which lie beyond the ends of the core. It will be observed that the three wires lie one above the other, not side by side—that is to say, when lying in a slot they will all be in the same plane radial of the cylinder—so that the coil has the thickness of one wire regardless of the number of turns. It will also be observed that the connecting sides *c d e f* are not bent inward toward the axis of the core, but extend outward in substantially the same plane as the sides *a b*.

Following the course of the coil (illustrated in Figs. 1 and 3) from the terminal 2, it will be observed that the upper wire (marked 8) and the adjacent wire 9 continue in the same relative positions, the wire 9 under wire 8, around the coil until wire 9 ends at the terminal 3, which is at the bottom of the coil. These wires do not cross or shift positions at the vertical drop or bend *g*, but, as shown in

Fig. 3, continue in parallelism; otherwise the ends 2 3 instead of being respectively at the top and bottom of the coil would both be at the top. The coil is distinguished by the fact that the thickness of all parts of the coil—*i. e.*, the dimension measured on a horizontal line parallel to a tangent of the armature—is equal to one thickness of wire, except at the vertical part, where it is equal to two thicknesses, as shown at the line 5 5, Fig. 3. This is true irrespective of the number of turns (in excess of two) of which the coil is composed. As shown in Figs. 1 to 3, which illustrate a coil of three turns, the third wire 10 at the vertical part lies behind the wires 8 9. A fourth wire would be alongside thereof, and in case of a greater number they would lie in pairs, one behind another, leaving the thickness at this part always twice that of the other parts of the coil.

The winding of the complete armature may be considered as composed of segments equal to the number of poles of the machine, each segment being composed of a group of coils, and each coil of a plurality of turns. The extent to which the connecting parts extend beyond the ends of the core is controlled by the number of coils in each group and will be somewhat greater than the sum of the thicknesses (or smallest cross-sectional dimensions) of the group of coils.

Fig. 2 clearly illustrates how the bends of the several coils permit the symmetrical arrangement of the coils in the manner already explained. Considering the relative positions of any two coils if the side c is within the corresponding side of the other coil—that is, between it and the end of the core—its side d will be outside of the corresponding side of such other coil, and vice versa. In other words, the sides of adjacent coils occupy reversed positions on opposite sides of the bend or offset. This is shown in Fig. 2, where the sides of one coil are marked c d, of another c' d', and of a third c^2 d^2. Owing to the vertical drop the sides d are in a plane just beneath that of the sides c, but only so far beneath as to permit the wires to cross each other—that is, to enable the wires composing a coil after making the turn at the angle g to pass inside of those wires which before the turn were outside of it, and vice versa. The construction at the two ends being identical it is unnecessary to repeat the description for the other ends of the coils formed by the sides e and f.

My application for patent hereinbefore referred to describes the means which I have designed for producing this coil.

Having thus clearly described my invention, what I claim as new, and desire to secure by Letters Patent, is—

A coil for armature-windings composed of a number of turns of round wire forming a hexagonal figure having two straight parallel sides to occupy slots in the armature-core, connecting parts in substantially the same plane as the sides, and a downward bend at each end of the coil, the latter being of a thickness of two wires across the bend, and of one wire elsewhere, substantially as described.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

ANDREW L. RIKER.

Witnesses:
C. LOFTIN,
A. C. SCHULZ.